Left, the C1 Compressor rotor being removed from AEDC's 16-foot transonic wind tunnel compressor to replace the rotor discs.
(Photo by Butch Brooks)

Left, boilermaker welder Ray Powers works on one of the instrument control cabinets at the AEDC Model Shop. (Photo by Gary Barton)

Below, the instrument control cabinet shown required 1,000 hours to be constructed. It weighs 7,000 pounds and will contain its own air conditioning unit to keep the interior components cool during tests. (Photo by Gary Barton)

PWT moves into 21st century

At right, standing left to right, Larry Towry, Kerry Syler (Hytorc sales representative), Tommy Bush and Van Davidson use the 37,000-foot pounds Hytorc hydraulic ratchet wrench to unbolt the solid coupling between the motor drive shaft and the 16T C1 compressor rotor. (Photo by Butch Brooks)

Below, shown is an instrument control cabinet at the 50 percent completion stage. It will be one of nine instrument cabinets constructed to house the new data and model control systems for 16T and 16S. (Photo by Gary Barton)

Below right, Brian Bergmann, Van Davidson, Jack Lowe and Larry Towry remove a spacer from 16 T C1 compressor in preparation for the rotor refurbishment. (Photo by Butch Brooks)

By Danette Duncan
AEDC Public Affairs

The Propulsion Wind Tunnel Sustainment Program is moving Arnold Engineering Development Center toward the 21st century by enhancing its world-unique capabilities.

By combining the ongoing and future efforts in the aircraft business area with the initiatives of the sustainment program, AEDC plans to improve productivity and test efficiency. According to PWT sustainment program manager Bob Lindeman, the combination is expected to improve productivity by a factor of two, reduce the cost of testing by a factor of two, take more data in shorter periods of time, reduce installation time, increase tunnel availability to more customers and respond faster to customer test inquiries.

The Air Force-funded program consists of four phases to automate four main areas in the PWT test facility. Every major U.S. aircraft, rocket and manned spacecraft program of the past 40 years has relied upon PWT to meet critical ground test needs.

"Most Department of Defense aerospace system development programs depend on the availability and reliability of these facilities and the quality data they produce," commented Aircraft Systems Test and Evaluation Department Director Jeff Long. "AEDC's aerodynamic test facilities are a national asset, and we (AEDC) have been presented with a window of opportunity. AEDC has the opportunity to reaffirm its position as the premier aerodynamics test center."

The program is scheduled for completion in fiscal 2004 with an approximate total cost of $80 million.

Already in progress, the first phase is roughly a $26 million effort to install all new data acquisition and control systems in PWT's 16-foot transonic and supersonic wind tunnels, model installation building and operation plants. "We're going to begin operation

this July in 16T, with the new data and model control systems," Lindeman said. "Over the next four years, we'll gradually add plant systems to that and have a fully automated facility in place at the end of 2004."

The second part, a $30 million effort, includes two new motor installations, two new transformers and a 90,000-kW electronic adjustable speed power system in the PWT main drive area. This effort will improve the start-up process for 16T and 16S and allow more flexibility when operating 16T at adjustable speeds to accommodate test requirements for AEDC's customers.

The third part is the addition of a second air dryer. The new dryer, scheduled to begin operation next year, will work in conjunction with the existing dryer to

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provide an unlimited supply of dry air for 16T, 16S and 4T. This $10-million effort scheduled to begin this summer will allow AEDC to run any of the wind tunnels continuously. The dryer will be operational by

spring 2000.

Lindeman said the fourth effort is around $13 million in improvements to 16S — improvements that the national wind tunnel complex was going to provide. Planning for this effort, which provides significant improvements to the flow quality performance of 16S, begins next year and will be implemented over a three-year period.

Time reduction going from the model installation building to the start of a test is one of the benefits expected as early as next year.

"The new systems and equipment in 16T will reduce the time from the current 50 hours to four hours," Lindeman said. "That makes more tunnel time available with the potential of adding more customers. We'll be able to take advantage of this starting next FY after the 1999 summer downtime."

In support of the program, the aircraft business area is redefining processes from the initial test inquiry from the customer and how AEDC translates those requirements into a test matrix to the model removal. Lindeman said critical factors in the overall success of this effort include developing and applying new test techniques, better analysis tools, improved support systems and attracting a broader base of customers.

Although equipment and technology are important, AEDC is spending an equal amount of emphasis on training people due to changing jobs and skills.

"The PWT Sustainment Program is key to our (AEDC) meeting the requirements of future decades and new aerospace systems such as the Joint Strike Fighter, F-22, F/A-18E/F, Joint Air-to-Surface Standoff Missile, Joint Direct Attack Munitions and a host of ongoing programs as well as space access programs," Long said. "We've been briefing our customers on our vision for the future of our test facilities and the key role of the PWT Sustainment and other investment programs. They have embraced these investments enthusiastically, because they recognize that modernized AEDC facilities will provide large benefits to the cost, schedule and technical quality of the systems they are developing."